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Abdominal decompression in normal pregnancy (Review)

Hofmeyr GJ, Kulier R

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[Intervention Review]

Abdominal decompression in normal pregnancy

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ABSTRACT

Background

Abdominal decompression was developed as a means of pain relief during labour. It has also been used for complications of pregnancy, and in healthy pregnant women in an attempt to improve fetal wellbeing and intellectual development.

Objectives

The objective of this review was to assess the effects of prophylactic abdominal decompression on pregnancy outcomes such as admission for pre-eclampsia, fetal growth, perinatal morbidity and mortality and childhood development.

Search methods

We searched the Cochrane Pregnancy and Childbirth Group's Trials Register (2 February 2012).

Selection criteria

Randomised trials comparing abdominal decompression with dummy decompression or no treatment in healthy pregnant women.

Data collection and analysis

Both review authors assessed eligibility and trial quality.

Main results

Three studies were included. There was no difference between the abdominal decompression groups and the control groups for low birthweight (risk ratio (RR) 0.69, 95% confidence interval (CI) 0.27 to 1.77) and perinatal mortality (RR 2.47, 95% CI 0.77 to 7.92). There were no differences in admission for pre-eclampsia, Apgar score and childhood development.

Authors' conclusions

There is no evidence to support the use of abdominal decompression in normal pregnancies. Future research should be directed towards the use of abdominal decompression during labour, and during complicated pregnancies.

PLAIN LANGUAGE SUMMARY

Abdominal decompression in normal pregnancy

Abdominal decompression is a procedure during which a negative pressure is applied intermittently to a pregnant woman's abdomen, enclosed within an airtight frame. It is thought to improve the mother's blood flow to the placenta, and during labour to relieve pain. The review of three studies of abdominal decompression used for healthy pregnant women found no benefits with respect to high blood pressure in the mother nor the newborn baby's condition and subsequent intellectual development. Avenues for further research remain.

BACKGROUND

Abdominal decompression was developed initially as a method of enhancing the forward movement of the uterus during labour contractions with a view to relieving pain. Unanticipated apparent beneficial effects on fetal wellbeing led to its investigation for this purpose (Hofmeyr 1989). A rigid dome is placed about the abdomen and covered with an airtight suit. The space around the abdomen is decompressed to -50 to -100 mmHg for 15 to 30 seconds out of each minute for 30 minutes once to thrice daily, or with uterine contractions during labour. This is thought to 'pump' blood through the intervillous space.

Prophylactic abdominal decompression came into clinical use in the early 1960s on the basis of the results of several poorly controlled studies. These appeared to show that it improved fetal wellbeing and intellectual development.

Two prospective studies followed in which attempts were made to compare the outcome in women subjected to abdominal decompression with comparable control groups.

OBJECTIVES

To determine, from the best available evidence, the effects on admission for pre-eclampsia, fetal growth, perinatal morbidity and mortality and childhood development of prophylactic abdominal decompression.

METHODS

Criteria for considering studies for this review

Types of studies

Clinical trials comparing prophylactic abdominal decompression with dummy decompression or no treatment; random allocation to treatment and control groups, with adequate allocation concealment; violations of allocated management and exclusions after allocation not sufficient to materially affect outcomes.

Types of participants

Healthy pregnant women.

Types of interventions

Abdominal decompression antenatally or during labour, versus no or dummy decompression.

Types of outcome measures

Pre-eclampsia, fetal growth, perinatal morbidity and mortality and childhood development. Outcomes included if clinically meaningful; reasonable measures taken to minimise observer bias; data available for analysis according to original allocation, irrespective of protocol violations; data available in format suitable for analysis.

Search methods for identification of studies

Electronic searches

We searched the Cochrane Pregnancy and Childbirth Group's Trials Register by contacting the Trials Search Co-ordinator (2 February 2012).

The Cochrane Pregnancy and Childbirth Group's Trials Register is maintained by the Trials Search Co-ordinator and contains trials identified from:

1. quarterly searches of the Cochrane Central Register of Controlled Trials (CENTRAL);
2. weekly searches of MEDLINE;
3. weekly searches of EMBASE;
4. handsearches of 30 journals and the proceedings of major conferences;
5. weekly current awareness alerts for a further 44 journals plus monthly BioMed Central email alerts.

Details of the search strategies for CENTRAL, MEDLINE and EMBASE, the list of handsearched journals and conference proceedings, and the list of journals reviewed via the current awareness service can be found in the 'Specialized Register' section within the editorial information about the Cochrane Pregnancy and Childbirth Group.

Trials identified through the searching activities described above are each assigned to a review topic (or topics). The Trials Search Co-ordinator searches the register for each review using the topic list rather than keywords.

We did not apply any language restrictions.

Data collection and analysis

Trials under consideration were evaluated for methodological quality and appropriateness for inclusion according to the prestated selection criteria, without consideration of their results. Both authors independently assessed trial eligibility and quality. Individual outcome data were included in the analysis if they met the prestated criteria in Types of outcome measures. Included trial data were processed as described in Clarke 1999.

Data were extracted from the sources and entered onto the Review Manager (RevMan) computer software (Update Software, Oxford, UK), checked for accuracy, and analysed as above using the RevMan software. For dichotomous data, risk ratios and 95% confidence intervals were calculated, and in the absence of heterogeneity, results were pooled using a fixed-effect model. Continuous data were pooled using mean differences and 95% confidence intervals.

RESULTS

Description of studies

See table of Characteristics of included studies.

Risk of bias in included studies

See table of Characteristics of included studies, particularly the 'Methods' and 'Notes' sections.

Liddicoat 1968 allocated women using random numbers administered by an independent person to receive antenatal decompression or to attend routine physiotherapy classes. Evaluation of the offspring was carried out blind to the allocation of each child. The drop-out rate was high (from 45% at nine months to 56% by three years of age). However, significant selective drop-out bias seems unlikely because there is no reason to suspect an imbalance in the drop-out population, and the mean IQ of mothers remaining in the study remained comparable in both groups.

Hofmeyr 1990 reviewed the original hospital notes of women in the study of Liddicoat 1968 to report on the perinatal data. Although 23% of results was unobtainable, there is again no reason to suspect that the composition of the groups was changed by the losses to follow up.

Coxon 1973 employed random selection and was able to blind the women and attendants to the allocation of each woman. However, the author's assumption that the 'placebo' treatment, consisting of abdominal decompression at minus 20 mmHg rather than minus 70 mmHg, would have little or no effect, is not necessarily valid.

Effects of interventions

Mathews and Loeffler found a slightly and statistically insignificantly greater increase in scalp blood pH after 20 contractions with abdominal decompression during labour than without (mean values +0.05 versus +0.01) (Mathews 1968).

Data from the remaining studies reveal no difference between the antenatal abdominal decompression and control groups for the following parameters: admission for pre-eclampsia, low birthweight, and Apgar score below four at one minute. The perinatal mortality was not reduced. Indeed, there was a small excess of deaths in the decompression group, but this may be a chance occurrence. Childhood development measures were not statistically different.

DISCUSSION

Those outcomes assessed in more than one trial yielded compatible results.

AUTHORS' CONCLUSIONS

Implications for practice

These studies provide convincing evidence that antenatal abdominal decompression used in uncomplicated pregnancies does not improve any of the outcomes measured. There is thus no support for the clinical use of antenatal abdominal decompression as a prophylactic procedure.

Intrapartum abdominal decompression has not been evaluated sufficiently for its use to be recommended or rejected.

Implications for research

Two quite unexpected observations merit further investigation as they may provide clues to the existence of psychosocial interactions or physiological mechanisms not specific to abdominal decompression. The first is that in the study of Liddicoat 1968, significantly more of the children in the abdominal decompression group were noted after three years to be undisciplined or aggressive (14/89 versus 2/90). The possibility that family expectations of superior intelligence gained from this or other childbirth techniques, may influence family dynamics and thus infant behaviour merits further investigation. The second interesting observation is that in the study of Coxon 1973, placental weights in the high decompression group were significantly less than in the low decompression group (627 [9] versus 653 [9] grams [SEM]). This observation may have a bearing on mechanisms which determine placental mass.

Further investigation of abdominal decompression as such, should be directed towards its use in certain complications of pregnancy and during labour, not during uncomplicated pregnancies.

ACKNOWLEDGEMENTS

Rene Liddicoate for additional information about her trial; Dr R Drubin for access to the files of women enrolled in the Liddicoate trial.

REFERENCES

References to studies included in this review

Coxon 1973 *{published data only}*

Coxon A, Fairweather DVI, Smyth CN, Frankenberg J, Vessey M. A randomised double blind clinical trial of abdominal decompression for the prevention of pre-eclampsia. *Journal of Obstetrics and Gynaecology of the British Commonwealth* 1973;**80**:1081-5.

Hofmeyr 1990 *{published data only}*

Hofmeyr GJ, Metrikin DC, Williamson I. Abdominal decompression: new data from a previous study. *British Journal of Obstetrics and Gynaecology* 1990;**97**:547-8.

Liddicoat 1968 *{published data only}*

Liddicoat R. The effects of maternal antenatal decompression on infant mental development. *South African Medical Journal* 1968;**42**:203-11.

References to studies excluded from this review

Mathews 1968 *{published data only}*

Mathews DD, Loeffler FE. The effect of abdominal decompression on fetal oxygenation during pregnancy and early labour. *Journal of Obstetrics and Gynaecology of the British Commonwealth* 1968;**75**:268-70.

Additional references

Clarke 1999

Clarke M, Oxman AD, editors. Cochrane Reviewers' Handbook 4.0 [updated July 1999]. In: Review Manager (RevMan) [Computer program]. Version 4.0. Oxford, England: The Cochrane Collaboration, 1999.

Hofmeyr 1989

Hofmeyr GJ. Abdominal decompression during pregnancy. In: Chalmers I, Enkin MW, Keirse MJNC editor(s). Effective care in pregnancy and childbirth. Oxford: Oxford University Press, 1989:647-52.

CHARACTERISTICS OF STUDIES

Characteristics of included studies *[ordered by study ID]*

Coxon 1973

Methods	Allocation by a system of random numbers. Were able to blind the women and attendants to the allocation of each woman.
Participants	Primigravidae with a single fetus. Exclusion criteria: medical or surgical complications. Those with essential hypertension or a history of renal disease were not excluded.
Interventions	Abdominal decompression from about 28 weeks of pregnancy for 15 seconds per minute for 30 minutes twice a week, pressure -70 mmHg (n = 200) versus -20 mmHg ('control') (n = 211).
Outcomes	Maximum blood pressure during pregnancy; hospital admission for pre-eclampsia; birthweight; placental weight; perinatal mortality.
Notes	United Kingdom. The author's assumption that the 'placebo' treatment, consisting of abdominal decompression at minus 20 mmHg rather than minus 70 mmHg, would have little or no effect, is not necessarily valid.

Risk of bias

Bias	Authors' judgement	Support for judgement
Allocation concealment (selection bias)	Low risk	Adequate

Hofmeyr 1990

Methods	Women allocated using random numbers administered by an independent person.
Participants	Inclusion criteria: pregnant women; able to attend regularly at the hospital; pregnancy < 30 weeks; no medical illness or obstetric complications.
Interventions	Antenatal decompression versus attendance at routine antenatal physiotherapy classes.
Outcomes	Gestation at delivery; caesarean section; assisted delivery; Apgar score < 7 at 1 minute; birthweight.
Notes	Johannesburg, South Africa. Early 1960s. Hofmeyr 1990 reviewed the original hospital notes of women in the study of Liddicoat 1968 to report on the perinatal data. Although 23% of results was unobtainable, there is no reason to suspect that the composition of the groups was changed by the losses to follow up.

Risk of bias

Bias	Authors' judgement	Support for judgement
Allocation concealment (selection bias)	Low risk	Adequate

Liddicoat 1968

Methods	Women allocated using random numbers administered by an independent person.
Participants	Inclusion criteria: pregnant women; able to attend regularly at the hospital; pregnancy < 30 weeks; no medical illness or obstetric complications.
Interventions	Antenatal decompression versus attendance at routine antenatal physiotherapy classes.
Outcomes	Evaluation of the offspring was carried out blind to the allocation of each child. South African Child Development Scale at 1, 4 and 9 months; Merrill-Palmer scale at 3 years.
Notes	Johannesburg, South Africa. The drop-out rate was high (from 45% at 9 months to 56% by 3 years of age). However, significant selective dropout bias seems unlikely because there is no reason to suspect an imbalance in the drop-out population, and the mean IQ of mothers remaining in the study remained comparable in both groups.

Risk of bias

Bias	Authors' judgement	Support for judgement
Allocation concealment (selection bias)	Low risk	Adequate

Characteristics of excluded studies *[ordered by study ID]*

Study	Reason for exclusion
Mathews 1968	Excluded because no clinically relevant outcomes reported. 20 women in labour were allocated 'at random' to early abdominal decompression, or to delay the initiation of decompression for 20 con-

Study	Reason for exclusion
	tractions. No statistically significant differences in fetal scalp blood changes over 20 contractions were found between the 2 groups.

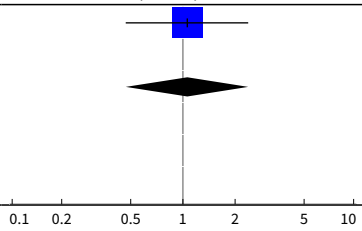
DATA AND ANALYSES

Comparison 1. Prophylactic abdominal decompression in pregnancy

Outcome or subgroup title	No. of studies	No. of participants	Statistical method	Effect size
1 Admission for pre-eclampsia	1	411	Risk Ratio (M-H, Fixed, 95% CI)	1.06 [0.47, 2.38]
2 Low birthweight	1	253	Risk Ratio (M-H, Fixed, 95% CI)	0.69 [0.27, 1.77]
3 Apgar score < 4 at 1 minute	1	242	Risk Ratio (M-H, Fixed, 95% CI)	1.0 [0.21, 4.86]
4 Stillbirth	2	709	Risk Ratio (M-H, Fixed, 95% CI)	4.68 [0.80, 27.31]
5 Neonatal death	2	705	Risk Ratio (M-H, Fixed, 95% CI)	1.11 [0.23, 5.43]
6 Perinatal mortality	2	709	Risk Ratio (M-H, Fixed, 95% CI)	2.47 [0.77, 7.92]

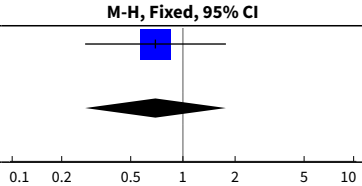
Analysis 1.1. Comparison 1 Prophylactic abdominal decompression in pregnancy, Outcome 1 Admission for pre-eclampsia.

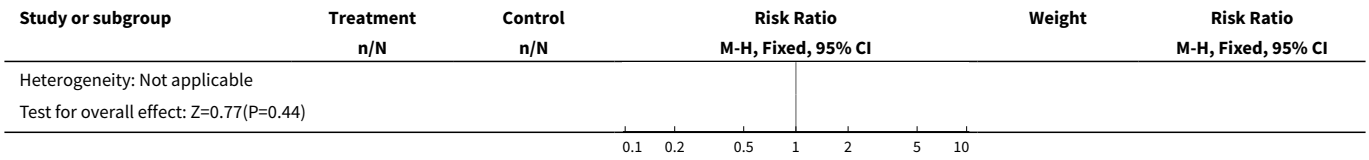
Study or subgroup	Treatment n/N	Control n/N	Risk Ratio M-H, Fixed, 95% CI	Weight	Risk Ratio M-H, Fixed, 95% CI
Coxon 1973	11/200	11/211		100%	1.06[0.47,2.38]
Total (95% CI)	**200**	**211**		**100%**	**1.06[0.47,2.38]**
Total events: 11 (Treatment), 11 (Control)					
Heterogeneity: Not applicable					
Test for overall effect: Z=0.13(P=0.9)					



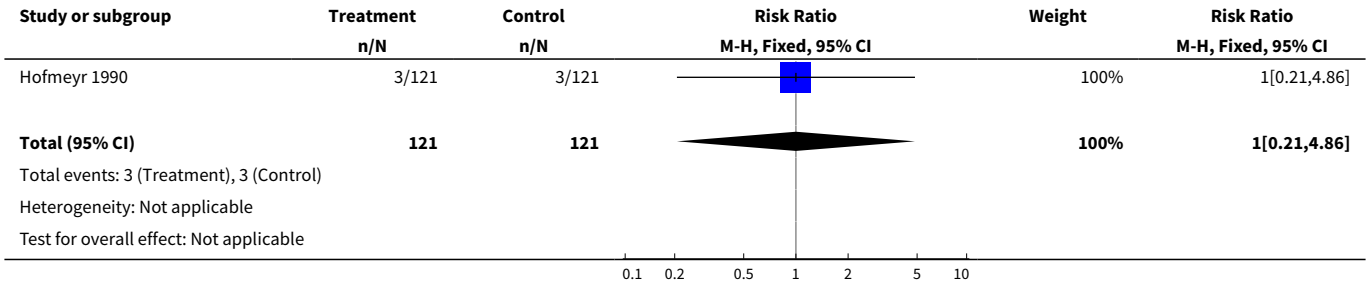
Analysis 1.2. Comparison 1 Prophylactic abdominal decompression in pregnancy, Outcome 2 Low birthweight.

Study or subgroup	Treatment n/N	Control n/N	Risk Ratio M-H, Fixed, 95% CI	Weight	Risk Ratio M-H, Fixed, 95% CI
Hofmeyr 1990	7/127	10/126		100%	0.69[0.27,1.77]
Total (95% CI)	**127**	**126**		**100%**	**0.69[0.27,1.77]**
Total events: 7 (Treatment), 10 (Control)					

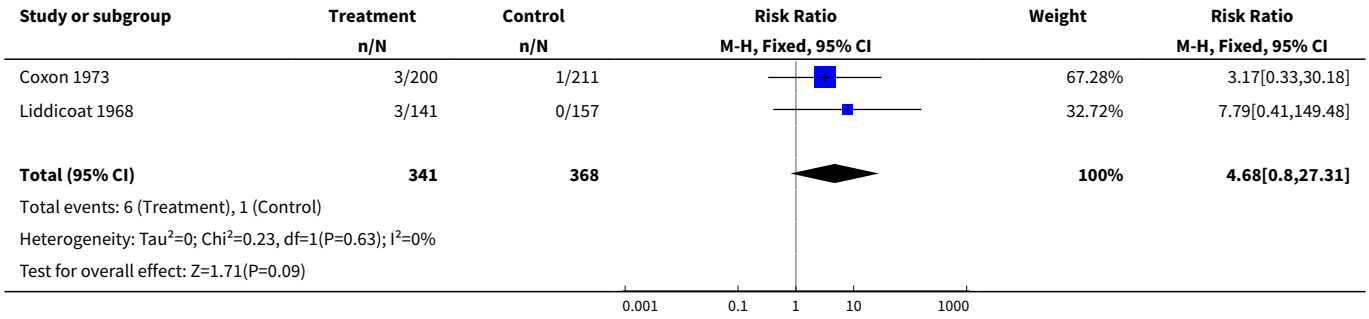




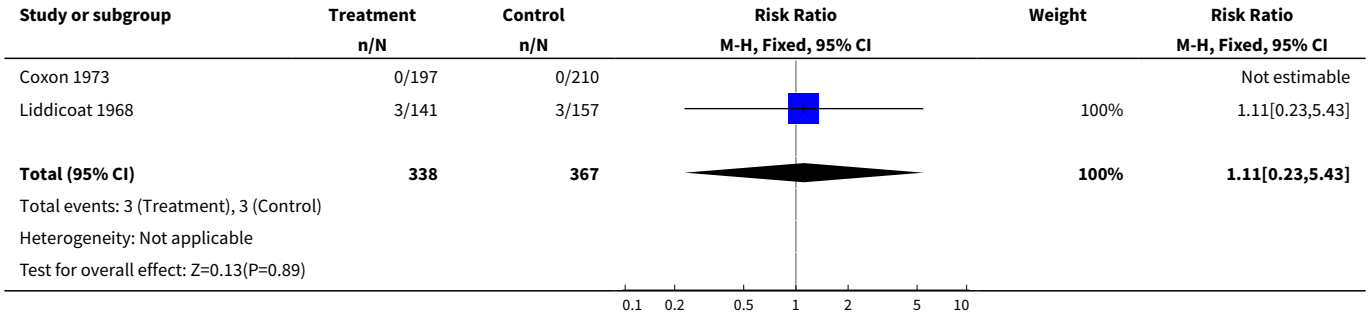
Analysis 1.3. Comparison 1 Prophylactic abdominal decompression in pregnancy, Outcome 3 Apgar score < 4 at 1 minute.



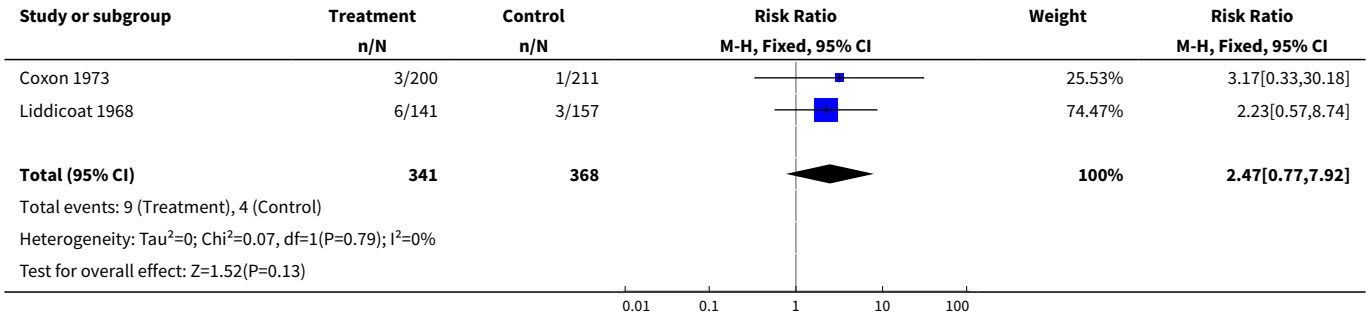
Analysis 1.4. Comparison 1 Prophylactic abdominal decompression in pregnancy, Outcome 4 Stillbirth.



Analysis 1.5. Comparison 1 Prophylactic abdominal decompression in pregnancy, Outcome 5 Neonatal death.



Analysis 1.6. Comparison 1 Prophylactic abdominal decompression in pregnancy, Outcome 6 Perinatal mortality.



WHAT'S NEW

Date	Event	Description
2 February 2012	New citation required but conclusions have not changed	Review updated.
2 February 2012	New search has been performed	Search updated. No new trials identified.

HISTORY

Protocol first published: Issue 2, 1998
Review first published: Issue 2, 1998

Date	Event	Description
2 July 2010	Amended	Contact details edited
24 June 2009	New search has been performed	Search updated. No new trials identified.
11 February 2008	Amended	Converted to new review format.
23 October 2007	New search has been performed	Search updated. No new trials identified.
25 October 2004	New search has been performed	Search updated. No new trials identified
27 January 2004	New search has been performed	Search updated. No new trials identified.
8 February 1998	New citation required and conclusions have changed	Substantive amendment

CONTRIBUTIONS OF AUTHORS

GJ Hofmeyr (GJH) prepared the original version of the review. R Kulier (RK) checked and modified the review. GJH and RK are responsible for maintaining the review.

DECLARATIONS OF INTEREST

The contact author is an author of one of the trials reviewed.

SOURCES OF SUPPORT

Internal sources

- University of the Witwatersrand, South Africa.
- Department of Obstetrics and Gynaecology, Geneva University Hospital, Switzerland.

External sources

- South African Medical Research Council, South Africa.

INDEX TERMS

Medical Subject Headings (MeSH)

*Child Development; Lower Body Negative Pressure [*methods]; Patient Dropouts [statistics & numerical data]; Pre-Eclampsia [prevention & control]; Pregnancy Complications [*prevention & control]; Randomized Controlled Trials as Topic

MeSH check words

Child, Preschool; Female; Humans; Pregnancy